REMARKS

At the outset, Applicants acknowledge with appreciation Examiner Langel's courtesy in conducting the November 16, 2005 personal interview. During the interview, Applicants' representative and Examiner Langel discussed proposed limitations of claim 1, the admitted prior art and the prior art references cited in the October 13, 2005 Office Action.

Claims 1-10 are pending in this application. Claims 1-10 have been amended. The specification has been amended to correct typographical errors and to insert appropriate headings throughout the specification. No new matter has been added.

Claims 1-10 are rejected under 35 U.S.C. §103(a) as being unpatentable over Le Blanc (U.S. Patent No. 5,011,625) or Burlingame et al. (U.S. Patent No. 6,855,272) in view of the admitted prior art (APA). Claims 1-9 are rejected under 35 U.S.C. §103(a) as being unpatentable over Le Blanc (U.S. Patent No. 5,011,625) or Burlingame et al. (U.S. Patent No. 6,855,272) in view of Singh et al. (U.S. Patent No. 6,818,198). These rejections are respectfully traversed.

The claimed invention relates to a process "for the production of synthesis gas by catalytic steam reforming." As such, amended independent claim 1 recites a process for the production of synthesis gas by "catalytic steam reforming of a hydrocarbon containing feedstock in parallel in an autothermal steam reformer and in a plurality of steam reformers in series." Amended independent claim 1 also recites that the heat for the steam reforming reactions in the plurality of steam reformers is provided "by indirect heat exchange with the combined effluents from the plurality of steam reformers with the autothermal steam reformer." Amended independent claim 1 further recites that "carbon monoxide containing gas is added to the feedstock prior to

the steam reforming in the autothermal steam reformer and/or prior to the steam reforming in the plurality of steam reformers."

Le Blanc relates to the production of ammonia synthesis gas "by reaction of steam, an oxidant, and a major portion of fresh hydrocarbon feed in an exothermic catalytic reforming zone to a first reformed gas having very low methane content." (Abstract). Le Blanc teaches that "[T]he balance of the fresh feed is reacted with steam in an endothermic catalytic reforming zone to a second reformed gas having a low methane content" and that "[T]he first and second reformed gases are combined and passed in indirect heat exchange with reactants in the endothermic reforming zone to provide all of the heat required therein and are then recovered as raw ammonia synthesis gas." (Abstract).

Burlingame relates to a syngas production process and a reforming exchanger. Burlingame teaches that the process involves "passing a first portion of hydrocarbon feed mixed with steam and oxidant through an autothermal catalytic steam reforming zone to form a first reformed gas of reduced hydrocarbon content, passing a second portion of the hydrocarbon feed mixed with steam through an endothermic catalytic steam reforming zone to form a second reformed gas of reduced hydrocarbon content, and mixing the first and second reformed gases and passing the resulting gas mixture through a heat exchange zone for cooling the gas mixture and thereby supplying heat to the endothermic catalytic steam reforming zone." (Abstract).

Singh relates to a method of recycling a portion of autothermal reformer effluent into the steam-hydrocarbon feed stream with a thermo-compressor ejector using the preheated feed mixture as motive fluid. Singh teaches that "syngas recycle-motive fluid molar ratios are 0.2-1.0, selected to optimize the overall configuration" and

that the recycle "introduces hydrogen and steam into the feed, and elevates the feed temperature, for operating the reformer in a soot-free regime." (Abstract).

The subject matter of claims 1-10 would not have been obvious over Le Blanc or Burlingame in view of the APA or Singh. Specifically, the Office Action fails to set forth a *prima facie* case of obviousness. Courts have generally recognized that a showing of a *prima facie* case of obviousness necessitates three requirements: (i) some suggestion or motivation, either in the references themselves or in the knowledge of a person of ordinary skill in the art, to modify the reference or combine the reference teachings; (ii) a reasonable expectation of success; and (iii) the prior art references must teach or suggest all claim limitations. See e.g., In re Dembiczak, 175 F.3d 994 (Fed. Cir. 1999); In re Rouffet, 149 F.3d 1350, 1355 (Fed. Cir. 1998); Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc., 75 F.3d 1568, 1573 (Fed. Cir. 1996).

In the present case, not all limitations of amended independent claim 1 are disclosed, taught or suggested by the prior art references, whether considered alone or in combination. None of Le Blanc, Burlingame, the APA or Singh, alone or in combination, discloses, teaches or suggests a process "for the production of synthesis gas by catalytic steam reforming" by "catalytic steam reforming of a hydrocarbon containing feedstock *in parallel* in an autothermal steam reformer and in a plurality of steam reformers *in series*," as amended independent claim 1 recites (emphasis added). Le Blanc teaches steam reformer 8 in parallel with reactor-exchanger 13, and not an autothermal steam reformer in parallel with a plurality of steam reformers which in turn are connected in series, as in the claimed invention. Burlingame teaches a reforming exchanger 100 "generally built according to the disclosure(s) in the Le Blanc {patent]," and not the structures recited in amended independent claim 1.

Similarly, the APA does not disclose, teach or suggest "catalytic steam reforming of a hydrocarbon containing feedstock *in parallel* in an autothermal steam reformer and in a plurality of steam reformers *in series*," as in the claimed invention (emphasis added). In addition, Applicants note that the assertion by the Examiner in the October 13, 2005 Office Action that "Applicants admit . . . that with most operating conditions ATR is not able to produce the desired ratio of hydrogen to carbon monoxide of 2.0, and that a tail-gas from the Fisher-Tropsch synthesis unit, which contains carbon monoxide, is recirculated upstream of the ATR reactor" is unsupported. Applicants submit that the specification of the application teaches against the recirculation of the tail gas to feed the adiabatic prereformer. The specification emphasizes that although "mixing of tail gas and a hydrocarbon feedstock and feeding the resultant mixture to an adiabatic pre-reformer is advantageous for production of synthesis gas . . . according to the present invention, recirculation of the tail gas to the feed to the adiabatic prereformer is disadvantageous because the risk of carbon formation will be higher in the prereformer." (¶[0007]). Accordingly, the APA does not teach or suggest the claimed invention.

Finally, Singh also fails to disclose, teach or suggest a process "for the production of synthesis gas by catalytic steam reforming" by "catalytic steam reforming of a hydrocarbon containing feedstock *in parallel* in an autothermal steam reformer and in a plurality of steam reformers *in series*," as in the claimed invention (emphasis added). Singh teaches "recycling a small portion of the autothermal reformer effluent into the steam-hydrocarbon feed stream, preferably with a thermo-compressor ejector that uses the preheated feed mixture as motive fluid," and not the processing steps and the structural limitations of the steam reformers of the claimed invention. For at least these reasons, the Office Action fails to establish a *prima facie* case of obviousness, and withdrawal of the rejection of claims 1-10 is respectfully requested.

Allowance of the application is solicited.

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Respectfully submitted,

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